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ABSTRACT

The United States Training and Employment Service General Aptitude Test Battery (GATB), first published in 1947, has been included in a continuing program of research to validate the tests against success in many different occupations. The GATB consists of 12 tests which measure nine aptitudes: General Learning Ability; Verbal Aptitude; Numerical Aptitude; Spatial Aptitude; Form Perception; Clerical Perception; Motor Coordination; Finger Dexterity; and Manual Dexterity. The aptitude scores are standard scores with 100 as the average for the general working population, and a standard deviation of 20. Occupational norms are established in terms of minimum qualifying scores for each of the significant aptitude measures which, when combined, predict job performance. Cutting scores are set only for those aptitudes which aid in predicting the performance of the job duties of the experimental sample. The GATB norms described are appropriate only for jobs with content similar to that shown in the job description presented in this report. A description of the validation sample and a personnel evaluation form are also included. (AG)

November 1969 United States Training and Employment Service Technical Report S-447

S-447

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Development of USTES Aptitude Test Battery

for

Welder, Production Line

(welding) 819.884

TM 002 05

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MANPOWER ADMINISTRATION

ED 069634

Technical Report on Development of USTES Aptitude Test Battery

for . . . .

Welder, Production Line (welding) 810.884-018

S-447

(Developed in Cooperation with the
Wisconsin State Employment Service)

Manpower Administration
U. S. Department of Labor

November 1969

FOREWORD

The United States Training and Employment Service General Aptitude Test Battery (GATB) was first published in 1947. Since that time the GATB has been included in a continuing program of research to validate the tests against success in many different occupations. Because of its extensive research base the GATB has come to be recognized as the best validated multiple aptitude test battery in existence for use in vocational guidance.

The GATB consists of 12 tests which measure 9 aptitudes: General Learning Ability, Verbal Aptitude, Numerical Aptitude, Spatial Aptitude, Form Perception, Clerical Perception, Motor Coordination, Finger Dexterity, and Manual Dexterity. The aptitude scores are standard scores with 100 as the average for the general working population, with a standard deviation of 20.

Occupational norms are established in terms of minimum qualifying scores for each of the significant aptitude measures which, in combination, predict job performance. For any given occupation, cutting scores are set only for those aptitudes which contribute to the prediction of performance of the job duties of the experimental sample. It is important to recognize that another job might have the same job title but the job content might not be similar. The GATB norms described in this report are appropriate for use only for jobs with content similar to that shown in the job description included in this report.

GATB Study # 2766

Development of USTES Aptitude Test Battery

For

Welder, Production Line (welding) 810.884-018

S-447

This report describes research undertaken for the purpose of developing General Aptitude Test Battery (GATB) norms for the occupation of Welder, Production Line (welding) 810.884-018. The following norms were established.

GATB Aptitudes	Minimum Acceptable GATB Scores
P - Form Perception	70
M - Manual Dexterity	75

RESEARCH SUMMARY

Sample:

116 male workers (56 Negroes, 1 American Indian and 59 non-minority group members) employed as Welder, Production Line in Wisconsin.

Criterion:

Supervisory ratings

Design:

Concurrent (test and criterion data were collected at approximately the same time).

Minimum aptitude requirements were determined on the basis of a job analysis and statistical analyses of aptitude mean scores, standard deviations and selective efficiencies.

Concurrent Validity:

Phi Coefficient = .58 ($P/2 < .0005$) (Same significance level obtained with minority group sub-sample and culturally deprived sub-sample).

Effectiveness of Norms:

73 percent of the nontest-selected workers used for this study were good workers; if the workers had been test-selected with the above norms, 91 percent would have been good workers. 27 percent of the nontest-selected workers used for this study were poor workers; if the workers had been test-selected with the above norms, only 9 percent would have been poor workers. The effectiveness of the norms is shown graphically in Table 1:

TABLE 1

Effectiveness of Norms

	Without Tests	With Tests
Good Workers	73%	91%
Poor Workers	27%	9%

Effectiveness of Norms with Minority Group Workers:

61 percent of the nontest-selected minority group workers in this study were good workers; if the minority group workers had been test-selected with the S-447 norms, 84 percent would have been good workers. 39 percent of the nontest-selected minority group workers in this study were poor workers; if the minority group workers had been selected with the S-447 norms, only sixteen percent would have been poor workers.

Effectiveness of Norms with Culturally Deprived Workers:

73 percent of the nontest-selected culturally deprived workers in this study were good workers; if the culturally deprived workers had been test-selected with the S-447 norms, 100 percent would have been good workers. 27 percent of the nontest-selected culturally deprived workers in this study were poor workers; if the culturally deprived workers had been selected with the S-447 norms, none of those selected would have been poor workers.

SAMPLE DESCRIPTION

Size:

N = 116

Work Setting:

Employed workers.

Employer Selection Requirements:

Education: None indicated.

Previous Experience: None indicated.

Tests: None indicated.

Other: Personal interview.

Principal Activities:

The job duties for each worker are comparable to those shown in the job description in the Appendix.

Minimum Experience:

All workers in the sample had at least one month total job experience.

TABLE 2

Means, Standard Deviations (SD), Ranges and Pearson Product-Moment Correlations with the Criterion (r) for Age, Education and Experience.

TABLE 2A (Combined Sample N=116)

	Mean	SD	Range	r
Age (years)	34.5	10.1	18-56	-.162
Education (years)	10.6	1.8	6-12	.021
Experience (months)	90.9	71.9	1-258	.183

TABLE 2B (Non-Minority Sub-Sample N=59

Age (years)	33.5	11.3	18-56	.102
Education (years)	10.7	1.6	6-12	-.166
Experience (months)	89.8	73.8	3-258	.418**

**Significant at the .01 level

TABLE 2C (Minority Sub-Sample N-57)

	Mean	SD	Range	r
Age (years)	35.6	8.7	19-51	-.310*
Education (years)	10.4	1.9	6-12	.232
Experience (months)	92.0	69.8	1-240	-.195

*Significant at the .05 level

TABLE 2D (Culturally "Exposed" Sub-Sample[1] N=72)

	Mean	SD	Range	r
Age (years)	31.6	9.1	18-56	-.203
Education (years)	11.2	1.3	7-12	.054
Experience (months)	76.4	60.8	3-240	.135

TABLE 2E (Culturally "Deprived" Sub-Sample[2] N=44)

Age (years)	39.1	10.1	19-56	.151
Education (years)	9.6	2.0	6-12	-.017
Experience (months)	112.7	81.1	1-258	.288

Experimental Test Battery

All 12 tests of the GATB, B-1002B, and the Research Questionnaire-Background were administered in April 1969.

CRITERION

The criterion data consisted of supervisory ratings of job proficiency made at approximately the same time as test data were collected. The immediate supervisor rated each worker.

Rating Scale:

Form SP-21 "Descriptive Rating Scale" was used. This scale (see Appendix) consists of nine items covering different aspects of job performance. Each item has five alternatives corresponding to different aspects of job proficiency.

1-Score of 7-10 based on interim scoring procedure for Research Questionnaire-Background (See Test Research Report No. 21, Development of Measure of Cultural Exposure, July 1968)

2-Score of 0-6 based on interim scoring procedure for Research Questionnaire-Background.

Reliability:

A correlation coefficient of .91 was obtained between the initial ratings and re-ratings, indicating satisfactory reliability. The reliability coefficients for sub-samples B, C, D and E were .89, .86, .90 and .91 respectively. The final criterion score consisted of the combined scores for the two ratings.

Criterion Score Distribution:

	Combined Sample	Non-Minority Sub-sample	Minority Sub-sample	Exposed Sub-sample	Deprived Sub-sample
Possible Range:	18-90	18-90	18-90	18-90	18-90
Actual Range:	34-85	34-85	44-76	34-82	44-85
Mean:	60.6	64.5	56.6	60.7	60.5
Standard Deviation	9.9	11.2	6.2	9.8	10.1

Differences in Mean Criterion Scores:

	First Rating	Second Rating	Final
Non-Minority Sub-sample	31.4	33.4	64.5
Minority Sub-sample	27.5	29.1	56.6
Difference	3.9	4.3	7.9

(All these differences in mean criterion scores are significant at the .01 level.)

Cult. Exposed Sub-sample	29.6	31.3	60.1
Cult. Deprived Sub-sample	29.2	31.2	60.5
Difference	.4	.1	.2

(None of these differences in mean criterion scores are significant at the .05 level.)

Criterion Dichotomy:

The criterion distribution was dichotomized into low and high groups by placing 26 percent of the sample in the low group to correspond with the percentage of workers considered unsatisfactory or marginal. Workers in the high criterion group were designated "good workers" and those in the low criterion group as "poor workers." The criterion critical score is 54 as this is the point the raters felt divided the marginal work group from the satisfactory and above average group.

APTITUDES CONSIDERED FOR INCLUSION IN THE NORMS

Aptitudes were selected for tryout in the norms on the basis of a qualitative analysis of job duties involved and a statistical analysis of test and criterion data. Aptitudes V and N were not considered for inclusion in the norms even though they correlated significantly with the criterion, since the qualitative analysis indicated that they were irrelevant to the performance of the job duties. Tables 3, 4 and 5 show the results of the qualitative and statistical analyses.

TABLE 3

Qualitative Analysis

(Based on the job analysis, the aptitudes indicated appear to be important to the work performed)

Aptitudes	Rationale
P - Form Perception	Necessary in determining whether the weld joint was full and smooth.
K - Motor Coordination	Necessary in holding the welding rod at the proper distance from the metal.
M - Manual Dexterity	Necessary in placing parts to be welded and in drawing welding rod along the joint to be welded.

TABLE 3b

(Based on the job analysis, the aptitudes indicated appear to be irrelevant to the work performed)

Aptitudes	Rationale
V - Verbal Aptitude	Performance of job does not depend on reading of instructions.
N - Numerical Aptitude	Performance of job does not involve arithmetic calculations or numerical reasoning.

TABLE 4

Means, Standard Deviations (SD), Ranges and Pearson Product-Moment Correlations with the Criterion (r) for the Aptitudes of the GATB.

Table 4A (Combined Sample, N=116)

	Mean	SD	Range	r
G - General Learning Ability	84.6	18.6	46-124	.333**
V - Verbal Aptitude	85.9	14.7	63-135	.239*
N - Numerical Aptitude	81.6	20.7	36-133	.309**
S - Spatial Aptitude	91.9	21.1	55-150	.288**
P - Form Perception	89.7	25.5	21-155	.317**
Q - Clerical Perception	97.8	18.1	57-134	.308**
K - Motor Coordination	87.4	19.0	35-134	.281**
F - Finger Dexterity	82.9	21.9	27-129	.338**
M - Manual Dexterity	88.6	20.6	38-155	.405**

Table 4B (Non-Minority Sub-Sample, N=59)

	Mean	SD	Range	r
G - General Learning Ability	97.3	13.1	70-124	-.033
V - Verbal Aptitude	94.5	13.2	74-135	-.059
N - Numerical Aptitude	93.6	14.7	60-133	.020
S - Spatial Aptitude	104.3	18.4	71-150	-.098
P - Form Perception	103.0	18.3	55-155	.022
Q - Clerical Perception	107.5	13.8	78-134	.050
K - Motor Coordination	93.5	12.8	68-134	.107
F - Finger Dexterity	88.2	20.2	27-127	.193
M - Manual Dexterity	92.3	19.8	53-155	.364**

Table 4C (Minority Sub-Sample, N=57)

	Mean	SD	Range	r
G - General Learning Ability	71.3	13.7	46-115	.304*
V - Verbal Aptitude	76.9	10.3	63-111	.152
N - Numerical Aptitude	69.2	18.6	36-117	.240
S - Spatial Aptitude	79.1	15.2	55-120	.445**
P - Form Perception	76.0	24.5	21-132	.329*
Q - Clerical Perception	87.7	16.4	57-126	.243
K - Motor Coordination	81.0	22.1	35-120	.304*
F - Finger Dexterity	77.4	22.3	31-129	.440**
M - Manual Dexterity	84.7	20.8	38-136	.423**

Table 4D (Culturally Exposed Sub-Sample, N=72)

	Mean	SD	Range	r
G - General Learning Ability	87.6	18.4	52-129	.303**
V - Verbal Aptitude	88.2	14.9	65-135	.168
N - Numerical Aptitude	83.9	20.1	40-133	.294*
S - Spatial Aptitude	97.4	20.1	58-150	.316**
P - Form Perception	95.9	22.7	39-133	.301**
Q - Clerical Perception	100.8	16.5	60-135	.208
K - Motor Coordination	91.7	17.7	35-134	.176
F - Finger Dexterity	87.7	22.2	27-129	.383**
M - Manual Dexterity	91.8	21.5	38-155	.393**

Table 4E (Culturally Deprived Sub-Sample, N=44)

	Mean	SD	Range	r
G - General Learning Ability	79.5	18.0	50-122	.397**
V - Verbal Aptitude	82.1	13.6	63-119	.373*
N - Numerical Aptitude	77.9	21.2	34-115	.336*
S - Spatial Aptitude	83.0	17.8	55-127	.277
P - Form Perception	79.6	26.5	21-155	.372*
Q - Clerical Perception	92.9	19.4	57-134	.456**
K - Motor Coordination	80.3	19.1	39-117	.460**
F - Finger Dexterity	74.9	18.9	44-127	.290
M - Manual Dexterity	83.3	18.0	44-128	.451**

* Significant at the .05 level.
**Significant at the .01 level.

Table 4F (Difference in Mean Aptitude Scores of Sub-Samples)

Aptitudes	G	V	N	S	P	Q	K	F	M
Sub-Sample B	97.3	94.5	93.6	104.3	103.0	107.5	93.5	88.2	92.3
Sub-Sample C	71.3	76.9	69.2	79.1	76.0	87.7	81.0	77.4	84.7
Difference	26.0	17.6	24.4	25.2	27.0	19.8	12.5	10.8	7.6
Sub-Sample D	87.6	88.2	83.9	97.4	95.9	100.8	91.7	87.8	91.8
Sub-Sample E	79.5	82.1	77.9	83.0	79.6	92.9	80.3	74.9	83.3
Difference	8.1	6.1	6.0	14.4	16.3	7.9	11.4	12.9	8.5

(All these differences in mean aptitude scores except for the difference on Aptitude N for sub-samples D and E are significant at the .05 or .01 levels. This difference for Aptitude N is not sifnificant.

TABLE 5

Summary of Qualitative and Quantitative Data

Type of Evidence	Aptitudes								
	G	V	N	S	P	Q	K	F	M
Job Analysis Data					X		X		X
Important									
Irrelevant		O	O						
Relatively High Mean				X	X	X			
Relatively Low Standard Dev.		X							
Significant Correlation with Criterion	X	X	X	X	X	X	X	X	X
Aptitudes to be Considered for Trial Norms	G			S	P	Q	K	F	M

DERIVATION AND VALIDITY OF NORMS

Final norms were derived on the basis of the degree to which trial norms consisting of various combinations of Aptitudes G, S, P, Q, K, F and M at trial cutting scores were able to differentiate between 73 percent of the sample considered to be good workers and 27 percent of the sample considered to be poor workers. Trial cutting

scores at five-point intervals approximately one standard deviation below the mean are tried because this will eliminate about one-third of the sample with three aptitude norms. For two-aptitude trial norms, minimum cutting scores of slightly more than one standard deviation below the mean will eliminate about one-third of the sample. For four-aptitude trial norms, cutting scores slightly less than one-SD below the mean will eliminate about one-third of the sample. The Phi Coefficient was used as a basis for comparing trial norms. The optimum differentiation for the occupation of Welder, Production Line (welding) 810.884-108 was provided by the norms of P-70 and M-75. The validity of these norms is shown in Table 6 and is indicated by a Phi Coefficient of .58 (statistically significant at the .0005 level.)

TABLE 6

Concurrent Validity of Trial Norms
P-70 and M-75

TABLE 6A (Combined Sample)

	Nonqualifying Test Scores	Qualifying Test Scores	Total
Good Workers	12	73	85
Poor Workers	24	7	31
Total	46	80	116

Phi Coefficient = .58 Chi Square (X^2_y) = 39.6

Significant Level = P/2 < .0005

TABLE 6B (Non-Minority Sub-Sample)

	Nonqualifying Test Scores	Qualifying Test Scores	Total
Good Workers	3	47	50
Poor Workers	7	2	9
Total	10	49	59

Phi Coefficient = .61 Chi Square (X^2_y) = 22.0

Significance Level = P/2 < .0005

TABLE 6C (Minority Sub-Sample)

	Nonqualifying Test Scores	Qualifying Test Scores	Total
Good Workers	9	26	35
Poor Workers	17	5	22
Total	26	31	57

Phi Coefficient = .47 Chi Square (X^2Y) = 12.5

Significance Level = P/2 < .0005

TABLE 6D (Culturally Exposed Sub-Sample)

	Nonqualifying Test Scores	Qualifying Test Scores	Total
Good Workers	6	47	53
Poor Workers	12	7	19
Total	18	54	72

Phi Coefficient = .49 Chi Square (X^2Y) = 17.4

Significance Level = P/2 < .0005

TABLE 6E (Culturally Deprived Sub-Sample)

	Nonqualifying Test Scores	Qualifying Test Scores	Total
Good Workers	6	26	32
Poor Workers	12	0	12
Total	18	26	44

Phi Coefficient = .68 Chi Square (X^2Y) = 20.6

Significance Level = P/2 < .0005

DETERMINATION OF OCCUPATIONAL APTITUDE PATTERN

The data for this study met the requirements for incorporating the occupation studied into OAP-28 included in Section II of the Manual for the General Aptitude Test Battery. A phi coefficient of .57 is obtained with the OAP-28 norms of S-75, P-75, M-75.

ANALYSES WITH RESEARCH QUESTIONNAIRE-BACKGROUND RESULTS

The dichotomy of "culturally deprived" and "culturally exposed" reported above was based upon the interim scoring procedure for the Research Questionnaire-Background. However, these forms were rescored according to the empirical scoring key for items 9-14 reported in Special Technical Report No. 21, "Development of a Measure of Cultural Exposure". Individuals with scores of 3, 4 or 5 were placed in the high group (N=50) and individuals with scores of 0-2 were placed in the low group (N=66). The results were similar to those reported above. In an additional analysis, the low group based on this scoring procedure was sub-divided into two groups of 33 each medium (score of 2) and low (scores of 0 or 1). The mean aptitude and criterion scores for these three groups are shown below.

	G	V	N	S	P	Q	K	F	M	CR1	CR2	CR3
H (N=50)	86	87	82	96	90	98	87	88	89	30	32	61
M (N=30)	78	81	76	82	85	95	88	79	88	29	31	60
L (N=30)	89	89	87	95	93	100	88	78	88	29	31	61

The Phi Coefficients obtained when the S-447 norms of P-70, M-75 where applied to these three samples were .44 (high group), .39 (medium group) and .78 (low group).

Form Approved
Budget Bureau No. 44-5907

A-P-P-E-N-D-I-X

DESCRIPTIVE RATING SCALE
(For Aptitude Test Development Studies)

Score _____ _____

RATING SCALE FOR _____
D. O. T. Title and Code

Directions: Please read the sheet "Suggestions to Raters" and then fill in the items listed below. In making your ratings, only one box should be checked for each question.

Name of worker (print) _____
(Last) (First)

Sex: Male _____ Female _____

Company Job Title: _____

How often do you see this worker in a work situation?

- ☐ See him at work all the time.
- ☐ See him at work several times a day.
- ☐ See him at work several times a week.
- ☐ Seldom see him in work situation.

How long have you worked with him?

- ☐ Under one month.
- ☐ One to two months.
- ☐ Three to five months.
- ☐ Six months or more.

A. How much work can he get done? (Worker's ability to make efficient use of his time and to work at high speed.)

- ☐ 1. Capable of very low work output. Can perform only at an unsatisfactory pace.
- ☐ 2. Capable of low output. Can perform at a slow pace.
- ☐ 3. Capable of fair work output. Can perform at a acceptable but not a fast pace.
- ☐ 4. Capable of high work output. Can perform at a fast pace
- ☐ 5. Capable of very high work output. Can perform at an unusually fast pace.

B. How good is the quality of his work? (Worker's ability to do high-grade work which meets quality standards.)

- ☐ 1. Very poor. Does work of unsatisfactory grade. Performance is inferior and almost never meets minimum quality standards.
- ☐ 2. Not too bad, but the grade of his work could stand improvement. Performance is usually acceptable but somewhat inferior in quality.
- ☐ 3. Fair. The grade of his work is mediocre. Performance is acceptable but usually not superior in quality.
- ☐ 4. Good, but the grade of his work is not outstanding. Performance is usually superior in quality.
- ☐ 5. Very good. Does work of outstanding grade. Performance is almost always of the highest quality.

C. How accurate is he in his work? (Worker's ability to avoid making mistakes.)

- ☐ 1. Very inaccurate. Makes very many mistakes. Work needs constant checking.
- ☐ 2. Inaccurate. Makes frequent mistakes. Work needs more checking than is desirable.
- ☐ 3. Fairly accurate. Makes mistakes occasionally. Work needs only normal checking.
- ☐ 4. Accurate. Makes few mistakes. Work seldom needs checking.
- ☐ 5. Highly accurate. Rarely makes a mistake. Work almost never needs checking.

D. How much does he know about his job? (Worker's understanding of the principles, equipment, materials and methods that have to do directly or indirectly with his work.)

- ☐ 1. Has very limited knowledge. Does not know enough to do his job adequately.
- ☐ 2. Has little knowledge. Knows enough to "get by."
- ☐ 3. Has moderate amount of knowledge. Knows enough to do fair work.
- ☐ 4. Has broad knowledge. Knows enough to do good work.
- ☐ 5. Has complete knowledge. Knows his job thoroughly.

E. How much aptitude or facility does he have for this kind of work? (Worker's adeptness or knack for performing his job easily and well.)

- ☐ 1. Very low aptitude. Has great difficulty doing his job. Not at all suited to this kind of work.
- ☐ 2. Low aptitude. Usually has some difficulty doing his job. Not too well suited to this kind of work.
- ☐ 3. Moderate aptitude. Does his job without too much difficulty. Fairly well suited to this kind of work.
- ☐ 4. High aptitude. Usually does his job without difficulty. Well suited to this kind of work.
- ☐ 5. Very high aptitude. Does his job with great ease. Unusually well suited for this kind of work.

F. How large a variety of job duties can he perform efficiently? (Worker's ability to handle several different operations in his work.)

- ☐ 1. A very limited variety. Cannot perform different operations adequately.
- ☐ 2. A small variety. Can perform few different operations efficiently.
- ☐ 3. A moderate variety. Can perform some different operations with reasonable efficiency.
- ☐ 4. A large variety. Can perform several different operations efficiently.
- ☐ 5. An unusually large variety. Can do very many different operations efficiently.

G. How resourceful is he when something different comes up or something out of the ordinary occurs? (Worker's ability to apply what he already knows to a new situation.)

☐ 1. Very unresourceful. Almost never is able to figure out what to do. Needs help on even minor problems.

☐ 2. Unresourceful. Often has difficulty handling new situations. Needs help on all but simple problems.

☐ 3. Fairly resourceful. Sometimes knows what to do, sometimes doesn't. Can deal with problems that are not too complex.

☐ 4. Resourceful. Usually able to handle new situations. Needs help on only complex problems.

☐ 5. Very resourceful. Practically always figures out what to do himself. Rarely needs help, even on complex problems.

H. How often does he make practical suggestions for doing things in better ways? (Worker's ability to improve work methods.)

☐ 1. Never. Sticks strictly with the routine. Contributes nothing in the way of practical suggestions.

☐ 2. Very seldom. Slow to see new ways to improve methods. Contributes few practical suggestions.

☐ 3. Once in a while. Neither quick nor slow to see new ways to improve methods. Contributes some practical suggestions.

☐ 4. Frequently. Quick to see new ways to improve methods. Contributes more than his share of practical suggestions.

☐ 5. Very often. Extremely alert to see new ways to improve methods. Contributes an unusually large number of practical suggestions.

I. Considering all the factors already rated, and only these factors, how satisfactory is his work? (Worker's "all-round" ability to do his job.)

☐ 1. Definitely unsatisfactory. Would be better off without him. Performance usually not acceptable.

☐ 2. Not completely satisfactory. Of limited value to the organization. Performance somewhat inferior.

☐ 3. Satisfactory. A fairly proficient worker. Performance generally acceptable.

☐ 4. Good. A valuable worker. Performance usually superior.

☐ 5. Outstanding.. An unusually competent worker. Performance almost always top notch.

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FACT SHEET

Job Title: Welder, Production Line (welding) 810.884-018
(Also in automobile manufacturing electrical equipment, engine and turbine and transportation equipment industries)

Job Summary:

Joins steel parts on production line using arc welding equipment to make final automobile frame or its component parts.

Work Performed:

Places component parts in fixture at work station to align them for welding. Picks up welding rod (electrode) from supply rack and inserts into portable holder. Strikes arc at beginning of joint by touching tip of rod to metal very briefly and pulling it about one-eight inch away from metal to begin weld. Guides welding rod along joint maintaining arc at a speed which produces a full, smooth weld joint. Repeats process as needed to complete the weld. Replaces welding rod as needed.

Effectiveness of Norms:

Only 73 percent of the nontest-selected workers used for this study were good workers; if the workers had been test-selected with the S-447 norms, 91 percent would have been good workers. 27 percent of the nontest-selected workers used for this study were poor workers; if the workers had been test-selected with the S-447 norms, only 9 percent would have been poor workers.

Effectiveness of Norms with Minority Group Workers:

61 percent of the nontest-selected minority group workers in this study were good workers; if the minority group workers had been test-selected with the S-447 norms, 84 percent would have been good workers. 39 percent of the nontest-selected minority group workers in this study were poor workers; if the minority group workers had been test-selected with the S-447 norms, only 16 percent would have been poor workers.

Effectiveness of Norms with Culturally Deprived Workers:

73 percent of the nontest-selected culturally deprived workers in this study were good workers; if the culturally deprived workers had been test-selected with the S-447 norms, 100 percent would have been good workers. 27 percent of the nontest-selected culturally deprived workers in this study were poor workers; if the culturally deprived workers had been selected with the S-447 norms, none of those selected would have been poor workers.

Applicability of These Norms:

The aptitude test battery is applicable to jobs which include a majority of the job duties described above.

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